

CLAIMS

1. An apparatus, operable with a plurality of remote stations capable of transmission on a shared resource, comprising:

a receiver for receiving a plurality of access requests for transmission on the shared resource from a respective plurality of remote stations and for measuring the utilization of the shared resource;

a scheduler for allocating a portion of the shared resource to zero or more of the requesting remote stations in response to the plurality of access requests, the allocation comprising zero or one common access grant to a subset of the requesting remote stations and for generating a busy command in response to the measured utilization; and

a transmitter for transmitting the common access grant to the remaining remote stations on one or more common grant channels and for transmitting a busy signal comprising one or more busy commands.

2. The apparatus of claim 1, wherein:

the scheduler further allocates with an allocation further comprising zero or more individual access grants to zero or more requesting remote stations; and

the transmitter further transmits the individual access grants to the respective remote stations on one or more individual grant channels.

3. The apparatus of claim 1, further operable with the plurality of remote stations equipped to transmit autonomously on the shared resource, using a limited portion of the shared resource, without an access request or access grant, and wherein:

the scheduler computes the expected amount of the shared resource to be consumed by the autonomous transmissions and allocates the portion of the shared resource for individual and common access grants in response thereto.

4. The apparatus of claim 1, further operable with one or more remote stations transmitting with permission from one or more access grants, the apparatus further comprising:

a decoder for decoding one or more received packets and determining if the one or more received packets decoded without error; and

wherein:

the receiver further receives the one or more packets of data from one or more remote stations, respectively;

the transmitter further transmits to the one or more remote stations an acknowledgment and grant extension (ACK-and-Continue) command, respectively, when the respective received packet decoded without error and the access grant for the respective remote station is to be extended; and

the scheduler determines the allocation of the portion of the shared resource in accordance with individual and common grants extended with the one or more ACK-and-Continue commands.

5. The apparatus of claim 1, wherein each busy command comprises one of a first value indicating a decrease or a second value indicating an increase.

6. The apparatus of claim 5, wherein each busy command alternately further comprises a third value indicating neither an increase or decrease.

7. The apparatus of claim 1, wherein each busy command comprises one of one or more values indicating respective one or more decreases, the respective decreases indicating different decrease amounts or one or more values indicating respective one or more increases, the respective increases indicating different increase amounts.

8. The apparatus of claim 7, wherein each busy command alternately further comprises a value indicating neither an increase or decrease.

9. A remote station, comprising:

a data buffer for receiving data for transmission;

a message generator for generating an access request message when the data buffer contains data for transmission;

a receiver for receiving one or more common grant channels from a base station and for receiving a busy signal from the base station;

a message decoder for decoding an access grant directed to the remote station, the access grant comprising a common grant on one of the one or more common grant channels; and

a transmitter for transmitting the access request message and for transmitting a portion of data from the data buffer in response to a decoded access grant in accordance with the received busy signal.

10. The remote station of claim 9, wherein:
 - the receiver further receives one or more individual grant channels from the base station; and
 - the message decoder further decodes an access grant comprising an individual grant directed on one of the one or more individual grant channels.
11. The remote station of claim 9, wherein the transmitter further transmits a limited portion of the data in the data buffer autonomously, irrespective of whether an access grant has been received, responsive to the received busy signal.
12. The remote station of claim 9, wherein:
 - the receiver further receives an ACK-and-Continue command; and
 - the transmitter transmits an additional portion of data from the data buffer in response to a previously decoded access grant, responsive to the received busy signal.
13. The remote station of claim 9, wherein the transmitter further transmits a limited portion of the data in the data buffer autonomously, subsequent to a received ACK, responsive to the received busy signal.
14. The remote station of claim 9, wherein:
 - the receiver further receives a NAK command; and
 - the transmitter retransmits the portion of data from the data buffer previously transmitted in response to a previously decoded access grant, responsive to the received busy signal.
15. The remote station of claim 9, wherein the transmission rate is decreased in response to an assertion on the received busy signal.
16. The remote station of claim 15, wherein the decrease is deterministic.

17. The remote station of claim 15, wherein the decrease is probabilistic.
18. The remote station of claim 9, wherein the transmission rate is increased in response to an assertion on the received busy signal.
19. The remote station of claim 18, wherein the increase is deterministic.
20. The remote station of claim 18, wherein the increase is probabilistic.
21. The remote station of claim 9, wherein the transmission rate is increased or decreased in response to the received busy signal, the amount of increase or decrease conditioned on a Quality of Service (QoS) service level.
22. A wireless communication system, comprising:
 - a plurality of remote stations, each of a subset of which transmit an access request message to form a plurality of access request messages;
 - a base station for:
 - receiving the plurality of access request messages;
 - measuring the utilization of the shared resource;
 - allocating a shared system resource among the plurality of remote stations;
 - transmitting zero or more individual access grants to a subset of the requesting remote stations and zero or more common access grants to the remaining requesting remote stations; and
 - transmitting a busy signal when the measured utilization exceeds a pre-determined threshold.
23. The wireless communication system of claim 22, wherein the requesting remote stations receive the transmitted individual or common access grants and the busy signal and transmit data to the base station respectively in accordance therewith, responsive to the received busy signal.

24. The wireless communication system of claim 22, wherein a subset of the plurality of remote stations transmit data autonomously, responsive to the transmitted busy signal.

25. A method of access control of a shared resource, comprising:
receiving a plurality of access requests for transmission on the shared resource from a respective plurality of remote stations;
allocating a portion of the shared resource to zero or more of the requesting remote stations in response to the plurality of access requests, the allocation comprising zero or one common access grant to a subset of the requesting remote stations;
transmitting the common access grant to the remaining remote stations on one or more common grant channels;
measuring the utilization of the shared resource; and
transmitting a busy signal when the measured utilization exceeds a pre-determined threshold.

26. The method of claim 25, wherein:
the allocation further comprises zero or more individual access grants to zero or more requesting remote stations; and
further comprising transmitting the individual access grants to the respective remote stations on one or more individual grant channels

27. The method of claim 25, operable with the plurality of remote stations equipped to transmit autonomously on the shared resource, using a limited portion of the shared resource, without an access request or access grant, further comprising:
computing the expected amount of the shared resource to be consumed by the autonomous transmissions and allocating the portion of the shared resource for individual and common access grants in response thereto.

28. The method of claim 25, operable with one or more remote stations transmitting with permission from one or more access grants, further comprising:
decoding one or more received packets;
determining if the one or more received packets decoded without error;

transmitting to the one or more remote stations an acknowledgment and grant extension (ACK-and-Continue) command, respectively, when the respective received packet decoded without error and the access grant for the respective remote station is to be extended; and

wherein the allocation of the portion of the shared resource is performed in accordance with individual and common grants extended with the one or more ACK-and-Continue commands.

29. The method of claim 25, wherein the busy signal comprises a series of commands, each command one of a first value indicating a decrease or a second value indicating an increase.

30. The method of claim 29, wherein the series of commands further comprise a third value indicating neither an increase or decrease.

31. The method of claim 25, wherein the busy signal comprises a series of commands, each command one of one or more values indicating respective one or more decreases, the respective decreases indicating different decrease amounts or one or more values indicating respective one or more increases, the respective increases indicating different increase amounts.

32. The method of claim 31, wherein the series of commands further comprise a value indicating neither an increase or decrease.

33. A method of transmission, comprising:
receiving data for transmission;
storing the data in a data buffer;
generating an access request message;
transmitting the access request message;
receiving one or more common grant channels from a base station;
decoding an access grant comprising a common grant on one of the one or more common grant channels;
receiving a busy signal from the base station; and

transmitting a portion of data from the data buffer in response to a decoded access grant adapted in accordance with the received busy signal.

34. The method of claim 33, further comprising:
receiving one or more individual grant channels; and
wherein the access grant alternately comprises an individual grant directed on one of the one or more individual grant channels.
35. The method of claim 33, further comprising transmitting a limited portion of the data in the data buffer autonomously, irrespective of whether an access grant has been received, responsive to the received busy signal.
36. The method of claim 33, further comprising:
receiving an ACK-and-Continue command; and
transmitting an additional portion of data from the data buffer in response to a previously decoded access grant adapted to the received busy signal.
37. The method of claim 33, further comprising transmitting a limited portion of the data in the data buffer autonomously, subsequent to a received ACK, responsive to the received busy signal
38. The method of claim 33, further comprising:
receiving a NAK command; and
retransmitting the portion of data from the data buffer previously transmitted in response to a previously decoded access grant, responsive to the received busy signal.
39. The method of claim 33, wherein the transmission rate is decreased in response to an assertion on the received busy signal.
40. The method of claim 39, wherein the decrease is deterministic.
41. The method of claim 39, wherein the decrease is probabilistic.

42. The method of claim 33, wherein the transmission rate is increased in response to an assertion on the received busy signal.

43. The method of claim 42, wherein the increase is deterministic.

44. The method of claim 42, wherein the increase is probabilistic.

45. The method of claim 33, wherein the transmission rate is increased or decreased in response to the received busy signal, the amount of increase or decrease conditioned on a Quality of Service (QoS) service level.

46. An apparatus, comprising:

- means for receiving a plurality of access requests for transmission on the shared resource from a respective plurality of remote stations;

- means for allocating a portion of the shared resource to zero or more of the requesting remote stations in response to the plurality of access requests, the allocation comprising zero or one common access grant to a subset of the requesting remote stations;

- means for transmitting the common access grant to the remaining remote stations on one or more common grant channels;

- means for measuring the utilization of the shared resource; and

- means for transmitting a busy signal when the measured utilization exceeds a pre-determined threshold.

47. An apparatus, comprising:

- means for receiving data for transmission;

- means for storing the data in a data buffer;

- means for generating an access request message;

- means for transmitting the access request message;

- means for receiving one or more common grant channels from a base station;

- means for decoding an access grant comprising a common grant on one of the one or more common grant channels;

- means for receiving a busy signal from the base station; and

means for transmitting a portion of data from the data buffer in response to a decoded access grant adapted in accordance with the received busy signal.

48. A wireless communication system, comprising:

means for receiving a plurality of access requests for transmission on the shared resource from a respective plurality of remote stations;

means for allocating a portion of the shared resource to zero or more of the requesting remote stations in response to the plurality of access requests, the allocation comprising zero or one common access grant to a subset of the requesting remote stations;

means for transmitting the common access grant to the remaining remote stations on one or more common grant channels;

means for measuring the utilization of the shared resource; and

means for transmitting a busy signal when the measured utilization exceeds a pre-determined threshold.

49. A wireless communication system, comprising:

means for receiving data for transmission;

means for storing the data in a data buffer;

means for generating an access request message;

means for transmitting the access request message;

means for receiving one or more common grant channels from a base station;

means for decoding an access grant comprising a common grant on one of the one or more common grant channels;

means for receiving a busy signal from the base station; and

means for transmitting a portion of data from the data buffer in response to a decoded access grant adapted in accordance with the received busy signal.

50. Processor readable media operable to perform the following steps:

receiving a plurality of access requests for transmission on the shared resource from a respective plurality of remote stations;

allocating a portion of the shared resource to zero or more of the requesting remote stations in response to the plurality of access requests, the allocation comprising zero or one common access grant to a subset of the requesting remote stations;

transmitting the common access grant to the remaining remote stations on one or more common grant channels;

measuring the utilization of the shared resource; and

transmitting a busy signal when the measured utilization exceeds a pre-determined threshold.

51. Processor readable media operable to perform the following steps:

receiving data for transmission;

storing the data in a data buffer;

generating an access request message;

transmitting the access request message;

receiving one or more common grant channels from a base station;

decoding an access grant comprising a common grant on one of the one or more common grant channels;

receiving a busy signal from the base station; and

transmitting a portion of data from the data buffer in response to a decoded access grant adapted in accordance with the received busy signal.